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	plant life	geology	Houston Independent School
science	astronomy	conservation	District, Houston, Texas
	weather	consumer science	Talent Preservation

17. ABSTRACT (MAX. 250 WORDS)

Unit III (six weeks) concerns plant life, and deals with thallus plants, mosses, ferns, and seed plants. Unit IV (six weeks) covers air and space, with subtopics on astronomy and weather. "The Changing Earth," dealing with geology and conservation, comprises Unit V (6 weeks). The last, Unit VI (6 weeks), deals with consumer science--biological and earth.

Level Three should be consulted for suggestions for Unit VI. The teacher is advised, in addition to the pages listed at the beginning of each unit in the Level Two Course, to refer to appropriate chapters in Level Three textbooks.

The teaching method suggested is to guide the student by asking questions. Each topic has textbook references, content outline, teaching suggestions, reference readings, and lists of audiovisual materials.

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COURSE OUTLINE

for

THIRD SIX WEEKS

of

SCIENCE - LEVEL II

TALENT PRESERVATION CLASSES

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Houston Independent School District

Houston, Texas

December, 1964

LEVEL TWO

UNIT III: PLANT LIFE (Approximately six weeks)

TOPIC 1: THALLUS PLANTS, MOSSES, AND FERNS

Textbook References

Living Things, pp. 66-83; expanded reading, pp. 268-322, 21-46.

Adventures in Science, pp. 294-299.

Science 2, pp. 198-209, 346-378.

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Content

A. Ways of classifying plants

1. By size and strength of stem
   a. Trees
   b. Shrubs
   c. Herbs
   d. Fungi
2. By differentiation of tissue
   a. Thallus plants
      (1) Dependent—fungi
      (2) Independent—algae
   b. Mosses
   c. Ferns
   d. Seed plants

B. Life functions (review)

1. Sensitivity
2. Food-getting
3. Digestion
4. Excretion
5. Growth
6. Respiration
7. Reproduction

Suggestions

Point out that although plants and animals differ from each other in many ways morphologically and physiologically, they have one characteristic in common. They both employ division of labor as a means of survival. Develop the idea that animals survive by differentiating the functions of body system complexes uniquely adapted to a given environment, and that plants follow a similar course by differentiation into stem, leaf, root, and reproductive structures. Point out also that plants as well as animals are engaged in a continuous competition for food resources, in which the winners survive.

Describe how plant life has ramified into numerous genera and species, and point out that those that still exist —being victors in the struggle for survival—must be considered more fit than those that fell into extinction. Explain how these victors may be divided into two main groups, as follows:

Independent plants: Those plants which have differentiated into successful stem, leaf, root, and reproductive structures in the competition for water, sunlight, gases (CO_2, O_2, N_2), and minerals. This group also includes some plants whose survival is not the result of extensive differentiation but of adapting to places that would not support other forms, such as water areas (algae).

C. Division of labor

D. Dependent thallus plants

1. Bacteria
   a. Types
      (1) Cocci
      (2) Bacilli
      (3) Spirilla
   b. Culture mediums
   c. Bacterial diseases
   d. Useful bacteria
2. Yeasts
3. Molds (antibiotics)
4. Other fungi
   a. Mildews and rusts
   b. Mushrooms
   c. Athlete's foot
   d. Ringworm
5. Viruses
6. Kinds of dependence
   a. Parasite
   b. Saprophyte
7. Cultural factors
   a. Heat
   b. Water
   c. Food
   d. Oxygen
   e. Communal tendency
8. Ways of combating unwanted dependent plants at home
9. Dependent plant reproduction
   a. Fission
   b. Budding (yeasts)
   c. Spore production

E. Independent thallus plants (algae)

1. Where algae grow
2. Kinds of algae
3. Reproduction of algae
4. Economic importance of algae

Dependent plants: Those plants which do not manufacture their own food but depend on other forms of life as sources of food. These plants will always be found close to their source plants or animals.

Prepare agar plates of bacteria. This is also a good time to review microscope techniques and the cellular nature of life.

Considerable time should be given to discussion and project work concerning the cultural factors of plants. It is important not only to provide certain major understandings concerning plant growth and development, but to help the students gain experience in forming generalizations. Some generalizations that may be developed are:

1. Disease-causing plants usually live best at the temperatures of the host.
2. Removal of one or more of the plant's cultural factors will extinguish or retard its further growth.
3. Community formation is usually not social in nature, but the result of a general response to a suitable environment by immobile forms of life. This is especially true for thallus plants, mosses, and ferns.
4. Dependent plants will be found near their sources of food.
5. Most dependent plants require atmospheric oxygen.

Develop some student research projects on questions such as the following:

1. How do mosses reproduce?
2. How do ferns reproduce?
3. What are some diseases that are caused by bacteria?
4. What are some diseases that are caused by viruses?
5. How are bacteria involved in the formation of humus?
6. How are spores transported to new places?

F. Mosses

1. Where mosses grow
2. Reproduction of mosses
3. Economic importance of mosses

G. Fern

1. Where ferns grow
2. Reproduction of ferns
3. Relationship between ferns and coal-formation
4. How ferns are advanced, as compared to mosses and thallus plants

7. Why do ferns and mosses live where they do?
8. Where does sphagnum moss grow and how is it involved in the formation of peat?
9. How do mosses and ferns accomplish sexual reproduction?
10. How was coal formed and what were the predominant plants at that time? Why do they not predominate today?
11. How do nitrogen-fixing bacteria help man?
12. What is fermentation? How are bacteria involved in this process? What are some fermentations that are helpful to man? What are some that are harmful to man?
13. What are five ways of protecting the home and body against dependent plants?

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Reference Readings

Cook, J. G. Virus in the Cell. Dial, 1957.

Dodge, B. S. Plants that Changed the World. Little, 1959.

Fontez, Q. P. Physiology of Plants. Harper, 1961.

Fuller, Harry. General Botany. Barnes, 1941.

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Haupt, A. W. An Introduction to Botany. McGraw, 1956.

Hutchins, R. E. Strange Plants and Their Ways. Rand, 1958.

Kavaler, Lucy. The Wonders of Algae. Day, 1961.

Neurath, Marie. Wonder World of Strange Plants. Lethrop, 1956.

Parker, B. M. The Plant World. Row, 1957.

Prescott, G. W. How To Know the Fresh-Water Algae. Brown, 1954.

White, A. T. Prehistoric America. Random House, 1951.

Audio-Visual Materials

Films

1391	Bacteria, Friend or Foe		11 min.
M2469	Fungi	C	16 min.

Filmstrips

Fs-732 Plants and Strange Animals of the Sea

Transparencies

Tr-1035 Moss Life History
Tr-1025 Fern Life History
Tr-1034 Blue-Green Algae
Tr-1028 The Fungus Plants

TOPIC 2: SEED PLANTS

Textbook References

Living Things, pages 88-117, 323-330, 356-378, 47-63
Adventures in Science, pages 266-276, 299-319
Science 2, pages 209-232

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Content

A. Classification of seed plants
   1. Cone-producers (conifers)
   2. Flower-producers
      a. Monocots
      b. Dicots
   3. Terms:
      a. Evergreen
      b. Annual
      c. Biennial
      d. Perennial
      e. Botony
      f. Classification

B. The plant cell

C. Parts of a seed plant
   1. Leaf
   2. Stem
      a. Xylem (up)
      b. Phloem (down)
   3. Root
   4. Flower (or cone)
      a. Male parts
      b. Female parts
   5. Fruit
   6. Pomme (as with apple)
   7. Seed
      a. Moncot—one "food sac"
      b. Dicot—two "food sacs"

Suggestions

Some students may desire to pursue plant taxonomy further than the scope of this outline. They may wish to explore the classifications in the binomial system: Phylum, Class, Order, Family, Genus, and Species. Try to interest such students in starting a school herbarium in which the extent of classification is carried down to Orders. To go beyond this would require considerable dedication in learning the numerous descriptive adjectives that are needed for assigning Genus and Species. However, an herbarium that is carried only to Order can be used as a good teaching aid in discussions concerning the cultural factors for seed plants.

All students should be able to classify flowering plants down to Class, and should be aware of the way in which seed plants fall into two sub-phylums: Cone-Producers and Flower-Producers. This classification may be made on the two following bases:

1. On the basis of leaves

Phylums: Seed producers

Sub-phylums:

Cone-producers—evergreen, often needle-like leaves
Flower-producers—broad leaves, often deciduous (falling off)

Classes:

Monocot—parallel veins
Dicot—netted veins

D. Photosynthesis and chlorophyll

E. Respiration

F. Germination of a seed

1. Light-seeking part of seed
2. Ground-seeking part of seed
3. Conditions for germination
   a. Heat
   b. Water
   c. Oxygen

G. Major functions of plant parts

1. Leaves
2. Stems
3. Roots
4. Flowers (or cones)
   a. Producing sex cells
   b. Promoting fertilization
      (1) Sepal and petal design and color
      (2) Self-pollination
      (3) Cross-pollination

H. A closer look at fertilization

1. Production of sex cells
   a. Haploid number of chromosomes
   b. Characteristics of sex cells
      (1) Pollen—small and many
      (2) Egg—large and few
2. The new individual (diploid)

I. Heredity

1. Law of dominance
2. Natural selection

J. Economic importance of green plants

1. Food
2. Lumber
3. Medicine and others

2. On the basis of flowers and cones

Phylum: Seed-producers

Sub-phylums:

Cone-producers

Flower-producers

Classes:

Monocot—petals three in number or multiples of three

Dicot—petals four or five in number

Emphasize the fact that all plants carry on respiration, whereas only the green ones carry on photosynthesis.

Considerable attention should be given to plant reproduction. The study of the flower will be one of the few times that the specifics of sexual reproduction will be studied by these students as part of their formal education. Following are some of the specific understandings to be developed:

1. Chromosomes carry the determiners (genes) of offspring characteristics.
2. Sex cells have only one-half (haploid) number of chromosomes that other cells have.
3. A new individual is created (a diploid cell) at the moment of fertilization.
4. The configuration of structures, such as flower structures, whose functions relate directly to reproduction involves but one purpose—to promote fertilization.
5. As with pollination, external forces are often needed to assure fertilization.

L. Conservation

1. Forest
2. Food
3. Soil
4. Water

Only brief discussion need be conducted on the economic importance of green plants and conservation, since these topics will be covered in more detail in a later unit.

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Reid, D. M. Introduction to Biology. Cambridge University Press, 1962.

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Shannon, Terry. The Wonderland of Plants. Whitman, 1960.

Swain, S. N. Plants of Woodland and Wayside. Garden City Books, 1958.

Wills, M. M. Roadside Flowers of Texas. University of Texas Press, 1961.

Audio-Visual Materials

Films

329	Butterfly Botanists	C	11 min.
1575	Carnivorous Plants	C	10 min.
1643	Green Vagabonds (seed dispersal)		10 min.
1155	Climbing Plants		10 min.
25	Flowers at Work		11 min.
2056	Growth of Flowers	C	11 min.
M1872	Growth of Seeds	C	13 min.
M1978	Learning About Leaves	C	12 min.
37	Leaves		11 min.
1160	Life of a Plant	C	10 min.
60	Roots of Plants	C	11 min.
486	Story of Dr. Carver		10 min.
435	Use of Forests		11 min.
1423	Your Friend the Forest	C	6 min.

Filmstrips

Fs-1177	Climate and Plants
FsG-1130	American Wildflower Guide (4 strips and manual)
Fs- 925	Parts of a Flowering Plant

Transparencies

Tr-1031	Structure of the Leaf
Tr-1040	Germination of a Bean
Tr-1039	Germination of the Corn Grain
Tr-1032	Cellular Structure of the Root
Tr-1029	Herbaceous Dicot Stem
Tr-1036	Monocot Stem Structure
Tr-1030	Structure of the Flower

COURSE OUTLINE

for

FOURTH SIX WEEKS

of

SCIENCE - LEVEL II

TALENT PRESERVATION CLASSES

Houston Independent School District

Houston, Texas

February 1965

LEVEL TWO

UNIT IV: AIR AND SPACE (Approximately six weeks)

Textbooks: Davis, Ira C., John Burnett, and E. Wayne Gross. Science 2: Experiment and Discovery. New York: Henry Holt and Company, 1958.

Jacobson, Willard J., Robert N. King, and Louise E. Killie. Adventures in Science 7. New York: American Book Company, 1959.

TOPIC 1: Astronomy

Textbook References

Adventures in Science 7, pp. 3-59.

Science 2: Experiment and Discovery, pp. 95-130; expanded reading, pp. 1-25.

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Content	Suggestions
A. The vastness of outer space	Guide student discussions and the development projects with such questions as the following:
1. The measurable universe a. Vacuum b. Matter c. Energy	1. How do stars and planets compare to atoms and molecules?
2. Light year (and speed of light)	2. How many miles are there in a light year?
	3. Why is the North Star important to navigators? How do you find it?
	4. What is an observatory? Why are they so often built on mountain peaks?
B. Stars	
1. Luminous objects	5. What is the difference between matter and energy?
2. Our sun a. Law of Gravitation b. Distance from Earth to the sun c. Relationship between mass, gravity, pressure, and stellar nuclear explosions	6. What were some of the beliefs of early astronomers?
	7. What is the difference between astronomy and astrology?
	Develop basic concepts concerning the following:
3. Proxima (Alpha) Centauri	1. The vast distances in outer space
	2. The vast size of stars and star systems

4. Constellations

5. Galaxies (Ours: the Milky Way)

6. Nebula

C. What is an orbit?

1. Centripetal force (gravity)

2. Centrifugal force

3. Apogee and perigee

D. Our Solar System

1. Size of the sun

2. Planets and their positions

3. Rotation of the planets
   a. Length of day per planet
   b. Earth's angle of declination

4. Revolution of the planets (elliptical orbit)
   a. Length of year per planet
   b. Earth's seasons

5. Four motions of Earth
   a. Rotation on its axis
   b. Revolution around the sun
   c. Movement of the sun in the galaxy
   d. Movement of the galaxy in the universe

6. Asteroids

7. Comets

8. Meteors

3. That all stars and star systems are in motion

Compare the Ptolemaic ideas with those of Copernicus and discuss the impact that each had on Western Civilization. Plan cooperatively with other Talent Preservation teachers in starting some reading projects that will help the students gain an overview of the history and development of Western Civilization, and at the same time strengthen their perception of the time and sequence of events-both secular and religious.

In the study of the solar system, guide student discussions and the development of student projects with such questions as the following:

1. What are the phases of the moon?

2. What are the motions of the moon?

3. What is the history of Halley's comet?

4. How many moons do other planets have?

5. What do we know about Venus?

6. What do we know about Mars?

7. How do the days and the years of the planets compare?

8. Why is the sun the most important object in our solar system?

9. What must be the main conditions on a planet if life is to exist there?

10. What facts lead us to believe that there is (or is not) life in outer space?

Make use of laboratory facilities, whenever feasible, for such learning activities as:

1. Constructing a telescope

2. Constructing a star box, using a shoe box, flashlight, and black paper with pin-holes to indicate constellations

9. The moon
   a. Distance between Earth and moon
   b. Source of illumination
   c. Characteristics
      (1) Size (compared to Earth)
      (2) Atmosphere
      (3) Gravity
      (4) No rotation (relative to Earth)
      (5) Revolution
   d. Eclipses
      (1) Of the sun
      (2) Of the moon

E. Exploration of space

1. Missiles
   a. Ballistic
   b. Guided

2. Problems of space travel
   a. Leaving the Earth
   b. Achieving orbit
   c. Reentry
   d. Meeting human needs

3. Using an illuminator and large and small balls to demonstrate an eclipse

4. Stretching a piece of flat rubber in such a way that the motion of a small ball will illustrate that of a satellite.

Discuss some of man's reasons for wanting to explore outer space; for example, to explore the moon's surface in search of meteorites containing organic remains.

Discuss some of the problems faced in space and the efforts being made at the Manned Spacecraft Center to develop ways of overcoming them. Keep a file of newspaper and magazine articles concerning these activities.

Reference Readings

Adler, Irving. Seeing the Earth from Space: What Man-made Moons Tell Us. Day, 1959.

_____. The Stars: Steppingstones Into Space. Day, 1956.

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Emme, E. M. Aeronautics and Astronautics. NASA, 1961.

Grey, Vivian. The First Book of Astronomy. Watts, 1959.

Heuer, Kenneth. Adventure in Astronomy. Viking, 1958.

Lauber, Patricia. All About the Planets. Random House, 1960.

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Moore, Patrick. Telescopes and Observatories. Day, 1962.

Wilkins, H. P. How To Make and Use a Telescope. Norton, 1956.

Audio-Visual Materials

Films:

L1674	Our Mr. Sun, Part I	C	30 min.
L1675	Our Mr. Sun, Part II	C	30 min.
2457	Space Science: Comets, Meteors, and Planetoids	C	11 min.
M2475	Space Science: The Planets	C	16 min.
M2343	The Sun and the Solar System	C	12 min.
488	The Sun's Family		11 min.
489	This Is the Moon		11 min.
M2304	A Trip to the Moon	C	16 min.
L2297	The Universe		28 min.
L2355	Aurora 7 (NASA)	C	29 min.
L2359	The Flight of Faith 7 (NASA)	C	29 min.
L2358	The Flight of Sigma 7 (NASA)	C	27 min.
L2356	Freedom 7 (NASA)	C	28 min.
L2364	The John Glenn Story (NASA)	C	31 min.
L2339	A Light in Nature	C	33 min.
1069	Tides		10 min.
1650	What Causes the Seasons		10 min.
M2158	The Big Bounce (Echo)	C	15 min.
2094	Why Seasons Change		11 min.
M1757	How We Explore Space	C	20 min.
2352	A Missile Named Mac	C	8 min.
L2154	The Nike-Hercules Story	C	27 min.
1922	Rockets: Principles and Safety	C	11 min.
M1923	Satellites: Stepping Stones to Space	C	11 min.
2449	Constellations: Guide to the Night	C	11 min.
1760	Exploring the Night Sky		10 min.
M2239	Frontiers in Space: Exploring the Universe with Telescopes	C	12 min.
1439	How Many Stars	C	11 min.
M1757	How We Explore Space	C	20 min.
M2315	The Milky Way	C	13 min.
L2146	The Nearest Star	C	29 min.

Filmstrips:

Fs-1485 The Earth Satellite: A Man-Made Moon
Fs- 608 Our Neighbor the Moon
Fs-1757 The Sky Above the Earth
Fs-1750 Starry Universe
FsG-2129 Universe and Solar System—Series 7
FsG-2140 Universe and Solar System—Series 8
Fs- 917 What Is in the Sky?
Fs-2370 Latitude, Longitude, and Time
Fs- 723 Day and Night

TOPIC 2: Weather

Textbook References

Adventures in Science 7, pp. 101-166; expanded reading, pp. 167-181.

Science 2: Experiment and Discovery, pp. 133-160.

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Content

A. The Earth's atmosphere

1. Composition of air
   a. Oxygen—21%
   b. Nitrogen—78%
   c. Others—1%

2. Atmospheric layers
   a. Troposphere
   b. Stratosphere
   c. Ionosphere
   d. Exosphere

B. Elements and compounds

1. The atom—basic unit of elements
   a. Nucleus of protons and neutrons
   b. Orbiting electrons
2. Some common elements
   a. Oxygen—accounts for about 50% of Earth's weight
   b. Silicon—accounts for about 25% of Earth's weight
   c. Carbon, Hydrogen, Nitrogen, Sulfur, Sodium, Chlorine

3. The molecule—basic unit of compounds
   a. Consists of two or more atoms
   b. Atoms combine in many different ways to produce different substances.

Suggestions

To develop a good background of understanding for the study of weather, provide some simple laboratory experiences with the invisible gases that comprise the air. Include such demonstrations as the following:

1. Have a burning candle fastened in a tray of water. Cover the candle with a wide-mouth bottle and note that about one-fifth of the air in the bottle is replaced by water.

2. Generate oxygen and demonstrate its role in combustion with the splint test; burn sulfur and steel wool in bottles of pure oxygen.

Conduct class discussions to develop the following understandings:

1. That most weather occurs in the troposphere . . . the lowest layer of the atmosphere about seven miles thick.

2. That the stratosphere extends about fifty miles above the troposphere and, together with it, constitutes that part of the atmosphere which is molecular in nature.

3. That about 99% of the Earth's air lies within the first 19 miles of the atmosphere.

4. That the ionosphere, (extending to about 400 miles above the Earth's surface) consists of substances whose atoms are unbalanced; i.e., they do not have equal numbers of protons and electrons.

C. Weather

1. Causes of weather
   a. Convection currents in air masses
   b. Land and sea breezes
   c. Differences in atmospheric pressure
      (1) Barometers
      (2) High and low pressure areas
   d. Humidity
      (1) The water cycle
      (2) Relative humidity
   e. Prevailing winds

2. Air masses and fronts
   a. Polar and tropical air
   b. Cyclones
      (1) Hurricanes
      (2) Tornadoes
      (3) Giant pressure areas

D. Climate

E. How to predict weather

F. Weather indicators

5. That the exosphere is the extremely rare transition between the Earth's atmosphere and outer space.

6. That a compound is a substance containing two or more elements.

7. That solar energy affects weather:
   a. By causing heating, expansion, and convection of air, which, along with the routine motions of Earth (rotation and revolution) provide the daily and seasonal variations in weather.
   b. By causing the air over land to warm and cool faster than air over water, resulting in onshore and offshore breezes.

8. That polar air generally moves in a southerly direction across the United States, adjacent to the ground; and tropical air rises and generally moves in a northerly direction, aloft.

9. That high pressure air usually means fair weather; and low pressure air usually means rain or snow.

10. That air masses move in a cyclonic motion, clockwise around an area of high pressure and counter-clockwise around an area of low pressure (in the Northern Hemisphere).

11. That warm air rises and can hold more water vapor, whereas cold air settles and can hold less water vapor (cause of the water cycle).

Urge the students to clip out weather maps from the newspaper and enter into some type of project work involving weather prediction.

(Note: A good weather indicator can be made by dissolving some cobalt chloride crystals ($CoCl_2$) in water and placing a few drops on a piece of filter paper. When humidity is high it will turn pink, when low, it will turn blue.)

Assign a group to do reading research and report to the class on the causes of thunder and lightning.

Reference Readings

Adler, Irving. Weather in Your Life. Day, 1959.

Antoine, Tex. Wonders of the Weather. Dodd, 1962.

Cooper, E. K. Discovering Chemistry. Harcourt, 1959.

Fenton, C. L. Our Changing Weather. Doubleday, 1940.

Fisher, James. Wonderful World of Air. Garden City Books, 1958.

Gaer, Joseph. Everybody's Weather. Lippincott, 1957.

Gallant, R. A. Exploring the Weather. Garden City Books, 1957.

Laird, Charles. Weathercasting. Prentice, 1955.

Meyer, J. S. Picture Book of the Weather. Lothrop, 1948.

Parker, B. M. Ask the Weatherman. Row, 1955.

Schneider, Herman. Everyday Weather and How It Works. McGraw, 1951.

Sloane, Eric. Eric Sloane's Book of Storms. Duell, 1956.

_____. Eric Sloane's Book of Weather. Little, 1952.

Spilhaus, A. F. Weathercraft. Viking, 1951.

Tannehill, I. R. All About the Weather. Random House, 1953.

Wolfe, Louis. Probing the Atmosphere: The Story of Meteorology. Putnam, 1961.

Wyler, Rose. First Book of Weather. Watts, 1956.

Audio-Visual Materials

Films:

360	Earth and Its Seasons		10 min.
L2147	The Inconstant Air	C	29 min.
L2365	The Restless Sea: Part I (tides)	C	30 min.
L2366	The Restless Sea: Part II (water cycle)	C	30 min.
1347	Tornado		11 min.
L1724	The Unchained Goddess: Part I	C	30 min.
L1725	The Unchained Goddess: Part II	C	30 min.
M2433	What Makes Weather	C	12 min.

Filmstrips:

Fs-252 Air About Us
FsG-2128 Air and Water: Series 7
FsG-2139 Air and Water: Series 8
Fs-2058 Clouds, Rain, and Snow
Fs-1176 Weather and Seasons
Fs-1655 Weather Fronts and Forecasting
Fs-726 What Makes Rain

COURSE OUTLINE

for

FIFTH SIX WEEKS

of

SCIENCE - LEVEL II

TALENT PRESERVATION CLASSES

Houston Independent School District

Houston, Texas

March 1965

LEVEL TWO

Unit V: The Changing Earth (Approximately six weeks)

Textbooks: Davis, Ira C., John Burnet, and E. Wayne Gross. Science 2: Experiment and Discovery. New York: Henry Holt and Company, 1958.

Fitzpatrick, Frederick L., and Thomas D. Bain. Living Things. New York: Henry Holt and Company, 1958.

Jacobson, Willard J., Robert N. King, and Louise E. Killie. Adventures in Science 7. New York: American Book Co., 1959.

TOPIC 1: Geology

Textbook Reference

Science 2: Experiment and Discovery, pp. 162-197.

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Content	Suggestions
A. Definition of geology	Define geology as a science that deals with the history of the earth. Expand on the following understandings:
B. Geological time	
1. Age of the earth	1. The earth is now, and has been for a long time, in a state of constant development.
2. Eras of development	
3. Records of the earth's past a. Fossils b. Coal and oil deposits c. Rock formations d. Carbon dating	2. One of the main objectives in modern geology is to learn the physical, chemical, and biological factors that bring about changes in the earth's surface. 3. Through knowledge of the developmental processes of the earth's surface, geologists can locate and identify such things as coal and oil deposits.
C. Forces that change the earth's surface	Involve the students in a number of simple laboratory tests and experiments, such as the following:
1. Volcanism	
2. Diastrophism	
3. Gradation a. Glaciers b. Running water c. Wind d. Gravity	1. Testing for limestone and marble by placing a drop of dilute hydrochloric acid (HCl) on the specimen. Bubbling indicates a positive test.

4. Weathering
   a. Temperature change
   b. Freezing and thawing
   c. Living things

D. Types of rock

1. Igneous (heat-formed)

2. Sedimentary (deposited)

3. Metamorphic (changed)

E. Some useful rock and minerals

1. Building stones
   a. Limestone
   b. Granite
   c. Marble
   d. Slate
   e. Others

2. Useful minerals (metallic)
   a. Aluminum
   b. Iron
   c. Copper
   d. Sulfur
   e. Calcium
   f. Zinc
   g. Lead
   h. Uranium
   i. Others

3. Precious stones
   a. Diamond
   b. Ruby
   c. Others

2. Using a settling tank filled with water and a heterogeneous mixture of sand and soil to demonstrate sedimentation.

3. Demonstrating some of the phenomenons of weathering. For example, lower a small water-soaked porous rock into a thermos jar of dry ice. Then thaw and check for fragments.

Sponsor student projects in the study of such questions as:

1. How old is the earth?

2. What minerals are mined in Texas?

3. What is the composition of the land under Houston? What is its history?

4. What are ocean floors like?

5. What are the main mountain ranges in America? How do they compare in age?

6. How is cement made? What are the ingredients in concrete?

7. How do crystals form?

8. What is the history of the Texas Gulf coast?

9. What story of the past is revealed by the study of fossils?

10. What are tidal waves? How are they caused?

Reference Readings

Adler, Irving. Rocks and Minerals and the Stories They Tell. Knopf, 1956.

Arnov, Boris, Jr. Inside Our Earth. Bobbs, 1961.

Bloch, M. H. Mountains on the Move. Coward, 1960.

Carson, R. L. Sea Around Us. Simon & Schuster, 1958.

Cothren, M. B. Buried Treasure: The Story of America's Coal. Coward, 1945.

Coleman, S. N. Volcanoes, New and Old. Day, 1946.

Cormack, Maribelle. First Book of Stones. Watts, 1950.

Daugherty, C. M. Searchers of the Sea: Pioneers in Oceanography. Viking, 1961.

Epstein, Samuel. The First Book of the Ocean. Watts, 1961.

Fenton, C. L. Rock Book. Doubleday, 1940.

_____. Rocks and Their Stories. Doubleday, 1951.

Field, R. M. Geology. Barnes, 1955.

Forsee, Aylesa. Beneath Land and Sea. Macrae Smith, 1962.

Gallant, R. A. Exploring Under the Earth. Garden City Books, 1960.

Houston Geological Society. Geology of Houston and Vicinity, Texas. Houston Geological Society, 1961.

Johnson, Gaylord. The Story of Earthquakes and Volcanoes. Messner, 1938.

Loomis, F. B. Field Book of Common Rocks and Minerals. Putnam, 1948.

Place, M. T. Our Earth: Geology and Geologists. Putnam, 1961.

Poole, Lynn. Volcanoes in Action: Science and Legend. McGraw, 1962.

Pough, F. H. All About Volcanoes and Earthquakes. Random House, 1953.

Richards, L. G. Ice Age Coming? The Story of Glaciers, Bergs, and Ice Caps. Day, 1960.

Schneider, Herman. Rocks, Rivers and the Changing Earth: A First Book About Geology. Scott, 1952.

Seaman, D. M. The Story of Rocks and Minerals: A Guidebook for Young Collectors. Harvey, 1956.

White, A. T. All About Our Changing Rocks. Random House, 1955.

Wyckoff, Jerome. The Story of Geology: Our Changing Earth Through the Ages. Golden, 1960.

Zim, H. S. Minerals, Their Identification, Uses, and How to Collect Them. Harcourt, 1943.

Audio-Visual Materials

Films:

L2350	About Time, Part I.	C	30 min.
L2351	About Time, Part II	C	30 min.
M2136	The Birth and Death of Mountains.	C	12 min.
L2144	Challenge of the Ocean.	C	29 min.
M2236	The Earth in Change: The Earth's Crust	C	16 min.
1904	The Face of the Earth	C	13 min.
L2148	The Hidden Earth.	C	29 min.
M1877	Minerals and Rocks.		16 min.
2015	The Mountains	C	10 min.
L1122	Birth of an Oil Field	C	30 min.
2473	Geological Work of Ice.	C	11 min.

Filmstrips:

Fs- 921 Our Changing Earth
Fs- 919 About Our Earth
Fs- 918 How Our Earth Began
Fs- 495 How Rocks Are Formed
Fs- 493 How We Think Our Earth Came to Be
Fs- 494 Our Earth Is Changing
FsG-2127 Rocks, Soils, and Minerals—Series 7
FsG-2138 Rocks, Soils, and Minerals—Series 8
Fs- 496 Story of the Earth We Find in Rocks
Fs-1388 Story of Ice and Glaciers

Slides:

SL 275 A Volcano Is Born (set of 30)

TOPIC 2: Conservation

Textbook References

Living Things, pp. 359-392.

Adventures in Science 7, pp. 61-97.

Science 2: Experiment and Discovery, pp. 214-232; expanded reading, pp. 197-214.

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Content	Suggestions
A. Soil conservation	Develop the concept that conservation is a planned management of natural resources that are important to man, and includes such actions as:
1. How soil is formed (Review of weathering)	1. Preservation
2. Soil profile a. Topsoil b. Subsoil c. Humus d. Bedrock	2. Protection
3. Erosion a. Water erosion b. Wind erosion	3. Prevention of destruction, exploitation, or neglect
4. Ways to control erosion a. Tree belts b. Contour plowing c. Strip farming d. Cover crops	Sponsor student projects and discussions in the study of such questions as: 1. What places have you seen which show evidence that erosion has taken place? What should be done to stop this erosion?
5. Soil improvement a. Important soil elements b. Nitrogen-fixing bacteria c. Irrigation d. Crop rotation e. Fertilizers	2. What are some of the ways in which the State of Texas controls erosion along its freeways? 3. During what times of the year are wind and water erosion most apt to occur? Why? 4. How would one go about making a compost heap? What is the value of such a heap? 5. Bacteria are said to be agents of decay. What does this mean? What would soil be like if such decay did not take place?
B. Forest conservation	
1. National and State Forests a. Selective cutting b. Forest insects and diseases c. Causes of forest fires	6. What do foresters do? How can we help them to manage the forests better? 7. In what parts of Texas are the State and National Forests located. (Show this on a map.)

2. Importance of forests
   a. Lumber and paper
   b. Prevention of erosion
   c. Raw materials for manufacturing

C. Water conservation

1. The water cycle

2. Control of flood waters
   a. Prevention of rapid run-off (erosion control)
   b. Purposes of reservoirs
   c. Importance of good drainage
   d. Purposes of levees

3. Water pollution near cities

4. Water shortages in America

5. Houston's program for water conservation

D. Conserving wild life (review)

8. It is said that over 4,000 items of manufactured goods contain some form of wood product. Make a list of those that you use in and around the home. Indicate the kind of wood product each contains.

Try to arrange a field trip to one of the paper mills in the Houston area. In addition to having the students observe the main processes, ask them to list the different jobs the men do and the unique skills required in order to make the overall process work.

Divide the class into committees for research and reports on such problems as:

1. How Houston industries use water and how they get rid of industrial wastes

2. How Houston families use water, and how the city sewage system works

3. How farmers use water, and how they control pollution

4. How sea water can be desalted for commercial and domestic use

Sources of information on conservation:

County Agricultural Agent
Agricultural Extension Service
Harris County Courthouse
Houston, Texas

Office of the Director
Texas Forest Service
College Station,
Texas 77843

Experimental Station
Texas A and M University
College Station,
Texas

U. S. Department of Agriculture
Forest Service
Washington, D. C. 20250

Reference Readings

Davis, W. B. The Mammals of Texas. Texas Game and Fish Commission, 1960.

Parker, B. M. Soil. Row, 1955.

Wolff, Leslie. Science and the Forester. Criterion Books, 1961.

Audio-Visual Materials

Films:

2278	Our Natural Resources	C	10 min.
1424	Your Friend the Soil.	C	6 min.
M1398	Yours Is the Land	C	20 min.
L1504	Clean Waters.	C	21 min.
1513	Water Supply.		11 min.
1874	Irrigating Farming.		11 min.
M1014	Water for Dry Land (Southwestern U. S. A.).		20 min.
1891	Texas Forestry.		11 min.
435	Use of Forests.		11 min.
1423	Your Friend the Forest.	C	6 min.

Filmstrips:

Fs-2147 Man's Use and Control—Series 8 (Conservation)
Fs-1469 Problems of Pollution
Fs-1225 Land of the Free—Agriculture in America

LEVEL TWO

(Sixth Six Weeks)

UNIT VI: CONSUMER SCIENCE—BIOLOGICAL AND EARTH (Approx. six weeks)

Textbook References

In addition to the pages listed at the beginning of each unit in the Level Two Course of Study, refer to the appropriate chapters in Level Three textbooks as well.

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Content

Review of Level Two Units

A. UNIT I: Animal Life

B. UNIT II: The Human Body

C. UNIT III: Plant Life

D. UNIT IV: Air and Space

E. UNIT V: The Changing Earth

Suggestions

This Unit is almost identical to Unit VI for Level Three. In order to avoid repetition, the last two units for Level Three may be consulted for suggestions that apply here.

Emphasize the following points in the review:

1. The seven life functions
2. Survival of the fittest
3. Cause and effect relationship
4. Health and safety
5. Water cycle
6. Conservation and regulatory agencies
7. Atomic and molecular nature of matter
8. The meaning of energy as related to the changing earth

In class discussions, try to incorporate these points in the various applications of content as they are realized by the students.

Give special attention to those students who missed the regular coverage of these units because of absence or late entry.